



US005411398A

United States Patent [19]

Nakanishi et al.

[11] **Patent Number:** **5,411,398**[45] **Date of Patent:** **May 2, 1995**[54] **MAGNETIC DISPLAY SYSTEM**[75] Inventors: **Masayuki Nakanishi**, Kanagawa;
Yasuyuki Kanno, Hiratsuka, both of
Japan[73] Assignee: **Japan Capsular Products, Inc.**,
Chiyoda, Japan[21] Appl. No.: **181,442**[22] Filed: **Jan. 14, 1994****Related U.S. Application Data**[63] Continuation-in-part of Ser. No. 892,123, Jun. 2, 1992,
abandoned.[51] Int. Cl.⁶ **B43L 1/00**[52] U.S. Cl. **434/409**; 273/239;
428/321.5; 428/323; 428/328; 428/329;
428/402.2; 428/402.21; 446/131[58] **Field of Search** 273/239; 428/321.5,
428/323, 402.2, 402.21, 328, 329; 434/409;
446/131[56] **References Cited****U.S. PATENT DOCUMENTS**

3,938,263	2/1976	Tate	434/409
4,232,084	11/1980	Tate	434/409
4,536,428	8/1985	Murata et al.	434/409
4,643,684	2/1987	Murata et al.	434/409
5,057,363	10/1991	Nakanishi	273/239

Primary Examiner—D. S. Nakarani

Attorney, Agent, or Firm—Wenderoth, Lind & Ponack

[57] **ABSTRACT**

A magnetic display system uses a display wherein a non-magnetic substrate has applied thereon a microcapsule coating layer having sealed light-absorptive magnetic particles and light-reflective non-magnetic particles which are dispersed in an oily liquid. A permanent magnet causes a shift of the light-absorptive magnetic particles in one direction and, as a result, causing a shift of the light-reflective non-magnetic particles in the other direction. In the microcapsule coating layer, microcapsules having a plurality of diameters within a range from 100 microns to 1,000 microns are combined together. Furthermore, the light-absorptive magnetic particles sealed in the microcapsules have a plurality of particle diameters ranging from 0.2 microns to several microns. A suitable amount of magnetic particles capable of becoming a permanent magnet when magnetized after the microcapsule coating layer is coated is added. The mean particle diameter of the light-reflective non-magnetic particles sealed in the microcapsules ranges from 0.01 microns to several microns. A suitable amount of the microcapsules having a particle diameter far more minute than the mean particle diameter of the microcapsules and having sealed therein only the transparent oily liquid is added to the microcapsule coating layer.

11 Claims, 6 Drawing Sheets